Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Redesignation of the 17.7-19.7 GHz	)	
Frequency Band, Blanket Licensing of	)	
Satellite Earth Stations in the 17.7-20.2 GHz	)	IB Docket No. 98-172
and 27.5-30.0 GHz Frequency Bands, and the	)	RM-9005
Allocation of Additional Spectrum in the	)	RM-9118
17.3-17.8 GHz and 24.75-25.25 GHz	)	
Frequency Bands for Broadcast Satellite-	)	
Service Use	)	

REPLY COMMENTS OF HUGHES ELECTRONICS, INC.

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Summary

The Comments in this proceeding reveal consensus on two broad themes:

(1) There is a need to blanket license satellite earth stations at 18 GHz;

(2) Given the dense and broad 18 GHz deployment intended by *both* terrestrial and satellite interests, the 18 GHz band should be segmented between satellite and terrestrial interests.

Thus, there are three core issues in need of resolution:

(1) How to fairly segment the 18 GHz band among the currently allocated services and licensed users of the band;

(2) How to transition incumbent users to other parts of the spectrum to ensure the viability of the ultimate 18 GHz band plan; and

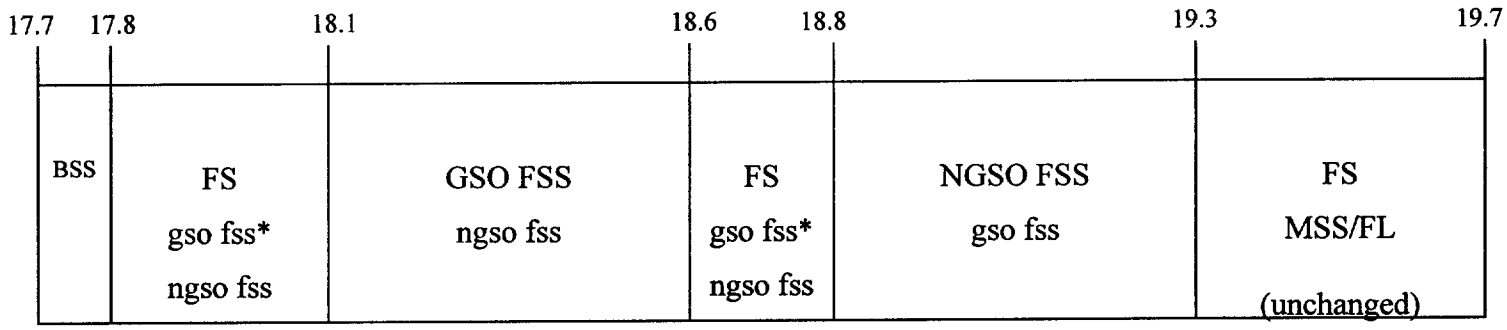
(3) What rules to adopt to permit blanket licensing of satellite earth stations in the 18 GHz band.

A. Band Segmentation.

Hughes urges the Commission to keep in mind that the 17.7-19.7 GHz band has been a shared satellite/terrestrial band for *over twenty-five years.* Thus, the current need for band segmentation is not a result of "emerging new services" displacing an incumbent, exclusive use. Instead, the need for segmentation results from a different paradigm: a broader deployment in the 18 GHz band by *both* satellite and terrestrial systems than was originally expected. Terrestrial users therefore have no greater "equities" in the 18 GHz band than the currently licensed Ka band satellite systems.

In fact, both terrestrial and satellite interests will benefit from a segmentation of the 18 GHz band, because band segmentation will result in faster and less expensive deployment of service by both sets of interests, and will permit both sides to deploy their stations more densely than would be possible if they were combined in a shared band. Therefore, the

Commission should take into account the mutual benefits that will flow from segmentation and should adopt the following band plan alternative:



* GSO FSS has coordination priority over NGSO FSS to allow effective use of corresponding uplink band.

Permanent grandfathering of existing users in the bands that are to be designated for primary FSS use would prevent a significant portion of the public from receiving innovative FSS service. Thus, Hughes supports a "sunset" of grandfathered status of FS users in FSS primary bands that would make current FS users secondary in these bands on January 1, 2004. In light of the fact that the 17.7 - 19.7 GHz band currently is shared on a co-primary basis and terrestrial interests will gain as much from segmentation as satellite interests, this roughly five-year phase out period provides a reasonable accommodation for both terrestrial users and satellite systems.

B. Blanket Licensing the GSO FSS.

The terms for blanket licensing GSO FSS earth terminals are not just technical, engineering issues: Rather, the terms for blanket licensing GSO FSS earth stations will have a fundamental impact on the ability of satellite systems to compete effectively with terrestrial telecommunications providers. Thus, these terms need to be developed with a view toward

facilitating the deployment of state-of-the-art satellite systems, and not just accommodating satellite system designs that are three or four years old.

Moreover, the Commission should not try to apply the terms of blanket licensing outside the United States. To do so would unduly constrain the ability of U.S. licensees to compete in foreign countries with foreign satellite systems that are not constrained by such FCC rules.

Hughes also urges the Commission to allow satellite operators the flexibility to continue to enter long-term coordination agreements, around which they can build their businesses, for the operation of systems that do not comply with the blanket licensing parameters.

Furthermore, in order to maintain the delicate balance reached in adopting the 28 GHz band plan, and to allow the GSO FSS continued access to sufficient uplink spectrum, Hughes reiterates the need to keep the 29.25-29.5 GHz band available for blanket licensing of GSO FSS earth stations.

C. Blanket Licensing the NGSO FSS.

Because the terms for NGSO earth station blanket licensing and the terms for NGSO FSS space station sharing are inextricably interrelated, NGSO blanket licensing must be dealt with in connection with developing the terms for NGSO/NGSO space station sharing. In light of the Commission's oft-stated policy goal to ensure multiple NGSO FSS systems access to the 18.8 - 19.3 and 28.6 - 29.1 GHz bands, the terms for NGSO blanket licensing must take into account the needs of second round NGSO FSS systems.

D. Secondary NGSO FSS Use of the Primary GSO FSS Bands.

Finally, with regard to the issues raised by Motorola about secondary NGSO FSS use of the primary GSO FSS bands, it is critical to keep in mind a fundamental tenet of the 28 GHz band plan adopted just two years ago: NGSO FSS systems outside the 18.8 - 19.3 and 28.6 - 29.1 GHz bands must operate on a secondary, strict noninterference basis to GSO FSS systems. Compliance by an NGSO system with possible new ITU rules does not ensure that the NGSO system will "not cause harmful interference" to primary GSO FSS systems. To substitute the ITU's rules for the Commission's own long-standing secondary licensing standards would be to totally disregard the terms of the Commission's 28 GHz band plan and the Ka band service Rules order. There is no basis to disrupt the delicate balance inherent in the 28 GHz band plan.

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REPLY COMMENTS OF HUGHES ELECTRONICS, INC.

Hughes Electronics, Inc., individually and on behalf of its subsidiaries, Hughes Communications, Inc., Hughes Communications Galaxy, Inc. and Hughes Network Systems, Inc. ("Hughes") hereby submits its Reply Comments in response to the initial comments filed in this proceeding. As explained in its Comments, Hughes has a vital interest in this proceeding as the FCC licensee of the SPACEWAY Ka band satellite system, as an applicant in the second Ka band processing round for the Spaceway EXP and Spaceway NGSO satellite networks,[1] and as a leading manufacturer of very small earth stations ("VSATs") and a leading provider of VSAT satellite services.

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1 Two Hughes Electronics affiliates, PanAmSat Corporation and DIRECTV Enterprises, Inc., are separately filing reply comments in this proceeding.

As a framework for the Commission's ultimate decision in this matter, the Commission should first recognize that there are several general principles with on which there is clear consensus among the commenters.

First, there is a need to blanket license satellite earth stations at Ka band. All of the satellite interests agree that blanket licensing is a vital step toward facilitating the rapid and economical deployment of ubiquitous earth stations for broadband satellite systems.[2] While many fixed service interests plead their unwillingness and inability to share with ubiquitously deployed earth stations, no terrestrial commenter disputes that blanket licensing is a necessary and important step for the deployment of the Ka band satellite systems that are currently licensed.

Second, given the dense and broad 18 GHz deployment intended by *both* terrestrial and satellite interests, the 18 GHz band should be segmented between satellite and terrestrial interests. Co-frequency sharing between these broadly-deployed satellite and terrestrial systems will be problematic, at best. In fact, a significant number of commenters --

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2 *See, e.g.*, Comments of Loral Space and Communications Ltd. at 2 (filed November 19, 1998) ("*Loral Comments*"); Comments of Lockheed Martin Corporation (filed November 19, 1998) at 13 ("*Lockheed Comments*"); Comments of KaStar Satellite Communications Corp. at i (filed November 19, 1998) ("*KaStar Comments*"); Comments of PanAmSat Corporation at 7 (filed November 19, 1998) ("*PanAmSat Comments*"); Comments of the Spectrum & Orbit Utilization Section of the Satellite Communications Division of the Telecommunications Industry Association at 5 (filed November 19, 1998) ("*TIA-SOUS Comments*"). BellSouth cites a study on MSS (not FSS) demand in mistakenly claiming that there is limited demand for Ka band services. Comments of BellSouth Corporation at 2 (filed November 19, 1998) ("*BellSouth Comments*").

both terrestrial and satellite[3] -- question the utility and efficacy of satellite/terrestrial sharing in the 18.55 - 18.8 GHz band that the Commission proposed for shared use in its NPRM.[4]

A recognition of the wide consensus on these two fundamental matters will permit the Commission to focus on the three core issues in need of resolution: (1) how to fairly segment the 18 GHz band among the currently allocated services and licensed users of the band, (2) how to transition incumbent users to other parts of the spectrum to ensure the viability of the ultimate 18 GHz band plan, and (3) what rules to adopt to permit blanket licensing of satellite earth stations at Ka band.

I. BAND SEGMENTATION AND ALTERNATIVE BAND PLANS

A. General Issues

Many of the terrestrial commenters advance the specious argument that the satellite systems deploying at Ka band are "emerging new services"[5] and that the effect of the Commission's segmentation proposal in the NPRM would be to reallocate "los[t] . . . FS spectrum"[6] at 18 GHz to these satellite systems. It appears that the underlying purpose of this argument is to try to create the impression that (i) terrestrial users somehow have greater

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3 *See, e.g.*, TIA-SOUS Comments at 2-3; Comments of GE American Communications Corporation at 8 (filed November 19, 1998) ("*GE Americom Comments*"); Comments of TRW Inc. at 6 (filed November 19, 1998) ("*TRW Comments*"); Comments of the Fixed Point-to-Point Section, Wireless Communications Division of the Telecommunications Industry Association at 5 (filed November 19, 1998) ("*TIA Fixed Section Comments*").

4 *Redesignation of the 17.7-19.7 GHz Frequency Band, Blanket Licensing of Satellite Earth Stations in the 17.7-20.2 GHz and 27.5-30.0 GHz Frequency Bands, and the Allocation of Additional Spectrum in the 17.3-17.8 GHz and 24.75-25.25 GHz Frequency Bands for Broadcast Satellite-Service Use*, FCC 98-235 at ¶ 30 (rel. September 18, 1998) ("NPRM").

5 TIA Fixed Section Comments at 12.

6 *Id.* at 4.

"equities" in the 18 GHz band than the currently licensed Ka band satellite systems, and (ii) the need for band segmentation between terrestrial and satellite systems is the result of a new "encroachment" by satellite systems on what the terrestrial interests erroneously assert is fixed service spectrum. Nothing could be further from the truth.

The arguments of the terrestrial interests conveniently ignore the fact, under Commission rules, that the 18 GHz band has been a shared satellite/terrestrial band for *more than twenty-five (25) years*! The co-primary FSS allocation at 18 GHz has existed since 1973[7] and the relevant portions of the Commission's terrestrial rules, under which the fixed point-to-point and CARS users are licensed, clearly provide that the 17.7 - 19.7 GHz band is shared with satellite systems.[8] Moreover, Sections 101.103 and 25.203 provide the general coordination mechanism between fixed users and satellite earth station receivers and Section 25.208(c) provides a downlink pfd limit to govern the permissible level of interference from satellite downlinks into terrestrial receivers. Section 25.208(c), the current terrestrial/satellite sharing rule, allows satellites to operate at an even higher power level than the proposed blanket licensing downlink pfd threshold. Thus, those terrestrial commenters[9] who argue that the Commission's proposed

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7 The 28 GHz band was one of the bands domestically allocated for FSS use in 1973 in order to address concerns that insufficient spectrum would be available at C band to accommodate domestic satellite operations. *See In Re Establishment of Domestic Communication-Satellite Facilities by Non-Governmental Entities*, 25 FCC 2d 718, (¶¶ 1-5) (1970); *In Re Amendment of Part 2 of the Commission's Rules to Conform with Space WARC 1971*, 39 FCC 2d 959 (1973).

8 47 C.F.R. § 101.101 (1997).

9 *See, e.g.,* TIA-Fixed Section Comments at 7; Comments of the Independent Cable and Television Association at 10, Technical Appendix at 1-2 (filed November 19, 1998) ("*ICTA Comments*"); BellSouth Comments at 10. Thus, ABC's claim that satellite downlinks somehow impermissibly interfere with ABC's terrestrial uses, Comments of

blanket licensing downlink pfd coordination threshold of -118 dBW/m^2/MHz will cause impermissible interference to terrestrial users are off base. The proposed downlink pfd coordination threshold is simply an intra-satellite-service matter and is solely intended to address satellite-into-satellite interference.

Furthermore, those terrestrial users who were utilizing the band even five years ago were placed on clear notice of the impending satellite use of the 18 GHz band when Hughes filed its initial application for the Spaceway satellite system, and again in 1995 when the Commission placed the twelve other Ka band satellite systems on public notice. Moreover, only two years ago, the Commission's 28 GHz band plan reaffirmed the shared satellite/terrestrial nature of the 18 GHz band[10] and more than eighteen months ago, fourteen satellite systems, including Hughes' Spaceway system, were licensed, without objection from the terrestrial interests, to use portions of the 18 GHz band for downlinks.

All of this is simply to say that both the terrestrial and the satellite interests have "come to the table" -- or the 18 GHz band -- legitimately, but with full knowledge of the other's interest and rights in that band. Thus, contrary to the implications in the terrestrial interest's comments, neither satellite or terrestrial systems should be entitled to any disproportionate equities in the process of segmenting the 18 GHz band. The legitimate needs of each service should be met. But the current need for band segmentation is not a result of "emerging new

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ABC, Inc. at 2 (filed November 19, 1998), is entirely unsubstantiated and counterintuitive.

10 *In the Matter of Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5 - 29.5 GHz Frequency Band, to Reallocate the 29.5 - 30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, 11 FCC Rcd 19005, ¶¶ 78, 81 (1996) ("*28 GHz Report and Order*").

services" displacing an incumbent, exclusive use.[11] Instead, segmentation of the 18 GHz band results from a different paradigm, namely, broader deployment in the 18 GHz band by *both* satellite and terrestrial systems than originally was expected by the Commission.[12]

Given this history at 18 GHz, Hughes agrees with those[13] who note how *both* terrestrial and satellite interests will benefit from the segmentation of the 18 GHz band. As Teledesic explains, band segmentation "results in faster and less expensive deployment for users of both services"[14] and "permits each service to deploy its stations more densely than would be possible for the two services combined in a shared band."[15] Thus, the Commission should take into account the mutual benefits that will flow from segmentation of the 18 GHz band.

B. Hughes Segmentation Proposal

In its initial comments, Hughes recommended seven factors that should govern the segmentation of the 18 GHz band[16] and it deferred suggesting an alternative 18 GHz band

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11 *See* Comments of the Fixed Wireless Communications Coalition at 2-3 (filed November 19, 1998) ("*FWCC Comments*").

12 Hughes originally proposed segmentation in 1983, but that proposal was rejected based upon opposition from terrestrial interests. *See Establishment of a Spectrum Utilization Policy for the Fixed and Mobile Services' Use of Certain Bands Between 947 MHz and 40 GHz*, 55 Rad. Reg. 2d 1171, ¶¶ 37, 41 (1984).

13 *See, e.g.,* Comments of Teledesic LLC at 3 (filed November 19, 1998) ("*Teledesic Comments*").

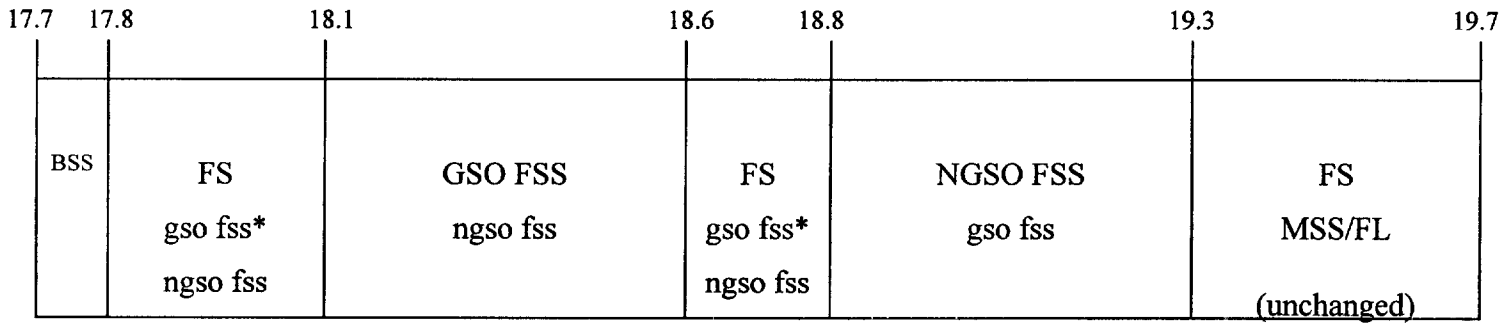
14 Teledesic Comments at 3.

15 Teledesic Comments at 3 (citing NPRM at ¶ 17).

16 "(1) GSO FSS operators need access to an additional 500 MHz of contiguous spectrum for downlinks to small, ubiquitous terminals; (2) NGSO FSS operators need 500 MHz for downlinks to small, ubiquitous terminals; (3) BSS operators need access to 100 MHz for service links to small DTH antennas; (4) The 18.6 - 18.8 GHz band cannot be used for FSS service to small, ubiquitous terminals, absent a suitable relaxation of the pfd limit there that protects the space sciences; (5) The 17.7 - 17.8 GHz band is uniquely suited for BSS downlink needs due to the international allocation for that band; (6) In light of

plan, largely because of the need to evaluate additional information regarding the actual terrestrial deployment in the 18 GHz band and alternative spectrum for certain of these systems. Hughes reiterates the need to take into account those seven factors and recommends the following 18 GHz band plan.

Hughes Alternative Band Plan



* GSO FSS has coordination priority over NGSO FSS to allow effective use of corresponding uplink band.[17]

In order to accommodate the spectrum needs of private cable and CARS operators who currently occupy the 18.142 - 18.580 GHz band, Hughes agrees with TIA-SOUS that the lower CARS band at 12.7 - 13.2 GHz should be opened for licensing by private cable

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consideration (4), the 500 MHz of contiguous GSO FSS spectrum may need to be met in the 17.8 - 18.6 GHz range; and (7) It is unfair and inequitable to place the burden of this band plan, if there is to be a burden, only upon the GSO FSS and BSS industries by failing to meet their needs." Comments of Hughes Electronics, Inc. at 13-14 (filed November 19, 1998) ("*Hughes Comments*").

17 *In the Matter of Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5 - 29.5 GHz Frequency Band, to Reallocate the 29.5 - 30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, 11 FCC Rcd 19005, ¶¶ 46, 49 (1997) ("*Ka Band Service Rules Report and Order*").

operators.[18] Hughes also suggests that the spectrum in the 21.2 - 21.8 GHz band should be opened for CARS licensing.

Thus, the Hughes alternative band plan would meet the spectrum requirements of the BSS, GSO FSS, and NGSO FSS while providing 500 MHz of exclusive spectrum and 400 MHz of shared spectrum for fixed point-to-point operations and identifying a total of 1100 MHz of potential co-primary replacement spectrum for CARS use.

The Hughes segmentation plan designates the 17.7 - 17.8 GHz band for BSS service links. As detailed in the comments of DIRECTV Enterprises, Inc., this band is unique for its international BSS allocation[19] and, in order to allow the prompt licensing and development of BSS systems, the Commission should designate the band as a part of the current segmentation process.[20] Thus, there is no basis for including the 17.7 - 17.8 GHz band in a rechannelization of the fixed service bands,[21] as doing so would preclude transitioning the band to its new designation. Finally, as discussed below with reference to grandfathering and incumbent relocation, there is no reason that existing FS users could not use the 17.7 - 17.8 GHz band during the transition to BSS use.[22]

The Hughes segmentation plan designates the 17.8 - 18.1 GHz band for the Fixed Service with the intention that the band be utilized primarily by point-to-point microwave users.

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18 TIA-SOUS Comments at 5.

19 *See* NPRM at ¶ 79.

20 Comments of DIRECTV Enterprises, Inc. at 9 (filed November 19, 1998) ("*DIRECTV Comments*").

21 NPRM at ¶ 79.

22 *See* DIRECTV Comments at 10.

As discussed below, Hughes does not have sufficient information about the go/return frequency separation or bandwidths needed by fixed point-to-point users to suggest a specific channelization plan, but Hughes believes that the full 900 MHz proposed for point-to-point use can be paired in a way to permit two-way operation, especially given the existing need, as described by TIA Fixed Section, for a rechannelization in any event of the FS portions of the 18 GHz band.[23]

The Hughes segmentation plan designates the 18.1 - 18.6 GHz band[24] for GSO FSS downlinks. This band segment will provide the additional 500 MHz of contiguous[25] spectrum for downlinks to the type of small, ubiquitous terminals that nearly all satellite-industry commenters agree is necessary for the deployment of the licensed and pending Ka band satellite systems.[26] The alternative band plans suggested by TIA-Fixed Section,[27] Comsearch,[28] KaStar,[29] Teledesic,[30] and Pegasus[31] are "non-starters" as they do not meet the baseline GSO FSS spectrum

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23 TIA Fixed Section Comments at 15.

24 As discussed in greater detail below, Hughes proposes limited grandfathering for the current licensees in the 18.10-18.14 GHz, 18.14 - 18.58 GHz and 18.58 - 18.6 GHz bands.

25 The SPACEWAY system requires two contiguous 500 MHz segments for its downlinks in order to make the most effective use of the spectrum. Contiguous downlink spectrum supports a lower-cost SPACEWAY user terminal, as well as reduced system costs in the satellite and ground control segments.

26 *See, e.g.,* TRW Comments at 5; GE Americom Comments at 4; Lockheed Comments at 2; PanAmSat Comments at 2; TIA-SOUS Comments at 4; Comments of Capitol Broadcasting Co., Inc. at Technical Comments p. 2 (filed November 19, 1998) ("*Capitol Broadcasting Comments*").

27 TIA-Fixed Section Comments at 4 (220 MHz for FSS).

28 Comsearch Comments at 4.

29 KaStar Comments at 7.

30 Teledesic Comments at 7.

requirements.[32] These proposals all suffer the same infirmity, namely the failure to provide a full 500 MHz of spectrum for ubiquitous earth station deployment, which is critically important to SPACEWAY and the other GSO broadband licensees.

These band plan proposals fail because they provide only 250 MHz or less for ubiquitous deployment of FSS earth stations and, even worse, locate 200 MHz of the 250 MHz in the 18.6 - 18.8 GHz band, which currently is not suitable for ubiquitous earth station deployment because of the pfd limit that now is in place to protect the space science service.[33] Thus, Hughes' proposal to designate the 18.1 - 18.6 GHz band for GSO FSS provides the necessary amount of spectrum and also avoids the need to change the current pfd limit governing the 18.6 - 18.8 GHz band to a higher power level that would support the successful deployment of ubiquitous GSO FSS earth stations.[34]

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31 Pegasus Comments at 5 (Option 2).

32 Hughes Comments at 7. Furthermore, Comsearch's suggestion, Comsearch Comments at 8, that earth station licensees locate their systems away from urban areas would preclude the use of 250 MHz of its band plan in urban areas, where capacity needs are the greatest. Moreover, Pegasus' proposal is further flawed because the record in the 28 GHz proceeding, CC Docket 92-297, demonstrates that there is no basis for thinking that MSS feeder links can coexist with the GSO FSS in the 19.3 - 19.7 GHz downlink band.

33 47 C.F.R. § 2.106, footnote US255 (1997).

34 If the Commission were to relax the pfd limit at 18.6 - 18.8 GHz in a manner that permits the successful deployment of ubiquitous USATs, Hughes would be willing to consider a designation of 18.3 - 18.8 GHz for GSO FSS. However, until this pfd limit is adequately relaxed, there simply is not sufficient certainty regarding the utility of that 200 MHz segment on which to make the substantial investment entailed in the deployment of a satellite system. Thus, while Hughes agrees with the amount of GSO FSS spectrum provided in the TRW and TIA-SOUS band plans, TRW Comments at 5, TIA-SOUS Comments at 4, Hughes does not support the designation of the 18.6 - 18.8 GHz band for GSO FSS at this time.

The Hughes segmentation plan designates the 18.6 - 18.8 GHz band for Fixed Service point-to-point microwave users. As indicated above, Hughes is not in position to suggest a channelization plan for the 17.8 - 18.1 GHz, 18.6 - 18.8 GHz, and 19.3 - 19.7 GHz bands. However, Hughes believes that, with appropriate input from the fixed point-to-point industry, the Commission can craft an appropriate channelization plan.

The Hughes segmentation plan designates the 18.8 - 19.3 GHz band for NGSO FSS, and the 19.3 -19.7 GHz band for shared use between Fixed Service point-to-point microwave users and NGSO MSS feeder links, in the same manner as the band is shared today. Finally, the Hughes segmentation plan identifies 1100 MHz of spectrum outside the 18 GHz band as potential co-primary replacement spectrum for the current CARS operations in the 18.142 - 18.580 GHz band.

C. Grandfathering

Hughes agrees with the comments of TIA-SOUS that permanent grandfathering of existing users in the bands that are to be designated for primary FSS use will "preclud[e] a significant portion of the public from receiving innovative FSS services . . . ."[35] Thus, Hughes supports a "sunset" of grandfathered status of FS users in FSS primary bands that would make current FS users secondary in these bands on January 1, 2004. In light of the fact that the 17.7 - 19.7 GHz band currently is shared on a co-primary basis and terrestrial interests will gain as much from segmentation as satellite interests, this roughly five-year phase out period provides a reasonable accommodation for both terrestrial users and satellite systems. Thus, Hughes

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35 TIA-SOUS Comments at 9.

disagrees with the comments of TIA-Fixed Section[36] and Pegasus,[37] who argue for a permanent and a ten year grandfathering period, respectively.

Moreover, based on TIA-Fixed Section's and ICTA's complaints that existing terrestrial users will receive harmful interference from satellite downlinks,[38] it appears that there is a clear need to transition these terrestrial users, who do not appear to have designed their systems to fully take into account existing satellite/terrestrial sharing rules.[39] And since these terrestrial do not appear to be able to tolerate satellite operations that comply with existing Commission Rules, there is no basis to suggest that satellite systems should pay to relocate these users.[40]

In short, because incumbent terrestrial users themselves desire band segmentation and, as discussed above, the need for band segmentation does not arise from a "reallocation" of the fixed service spectrum, satellite services should not bear the burden of band segmentation and relocation of the terrestrial service.[41]

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36 TIA-Fixed Section Comments at Appendix A at 8.

37 Pegasus Comments at 8.

38 TIA-Fixed Section Comments at 7; ICTA Comments at 10, Technical Appendix at 1-2.

39 *See, supra,* note 9 and accompanying text.

40 *See* ABC Comments at 2-3.

41 With respect AESCO Systems' claim about the effect on terrestrial interests of the Commission's proposal to make any terrestrial licensee subject to the outcome of this proceeding, Hughes respectfully refers the Commission to Hughes Comments and the Consolidated Opposition of Hughes Communications, Inc. and Hughes Communications Galaxy, Inc. filed November 12, 1998 in this docket.

D. Secondary Uses

Hughes also agrees with TIA-SOUS and others[42] that there is no reason to allow secondary terrestrial uses of the FSS primary bands. As many parties have noted, the whole reason for band segmentation is the fact that the types of terrestrial and satellite uses currently contemplated for the 18 GHz band are not compatible. To permit secondary terrestrial use would reintroduce the types of costs and delay that militate in favor of segmentation in the first place. Moreover given that terrestrial users now claim that they cannot exist with satellite services under *existing co-primary* sharing criteria,[43] there is no reason to think that any such secondary uses could develop.

II. PARAMETERS FOR GSO FSS BLANKET LICENSING

For the reasons stated in Hughes's initial comments, the terms for blanket licensing GSO FSS earth stations can have a fundamental impact on the ability of satellite systems to compete effectively with terrestrial telecommunications providers. Thus, these terms need to be developed with a view toward facilitating the deployment of state-of-the-art satellite systems, and not just accommodating system designs that are three or four years old. Moreover, in developing these terms, the Commission needs to take into account whether the technical values being advanced for two-way telecommunications service would unduly constrain the use of the Ka band for other purposes, such as direct-to-home video.

Below, Hughes responds to three main issues raised in the Comments: (i) the impact on other systems of the more technically-advanced blanket licensing parameters that

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42 TIA-SOUS at 2-4; Teledesic at 4; TIA-Fixed Section at Appendix A at 3 ("secondary status of little practical use to the fixed service").

43 *See, supra,* note 9 and accompanying text.

Hughes has advocated, (ii) the applicability of these blanket licensing provisions outside the United States, and (iii) the ability of adjacent satellite operators to enter into long-term coordination agreements around which they can build their businesses. In addition, Hughes reiterates the need to keep the 29.25-29.5 GHz band available for blanket licensing of GSO FSS earth stations.

A. Blanket Licensing Parameters.

As the Commission is aware, a number of "first round" Ka band GSO FSS licensees have formed an industry working group, known as the "BL-WG," to seek to develop uniform blanket licensing parameters. That group has not included any "new" applicants in the second Ka band processing round, and has not included any parties who are interested in using the Ka band for direct-to-home service.[44]

From the comments, it is clear that the proposal of the BL-WG in its November 18, 1998 report does not reflect consensus among Ka band licensees and applicants on the appropriate terms for blanket licensing. In addition to Hughes, PanAmSat[45] and DIRECTV,[46] several other companies recommend parameters that differ from those of the BL-WG.[47]

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44 Although Hughes participated in the work of the BL-WG, Hughes declined to sign the BL-WG's November 18, 1998 Report primarily because it reaches conclusions about certain significant issues, endorses the applicability of its results in certain circumstances, and states that the BL-WG relied on certain "presumptions" that, in fact, (i) were not adequately, if at all, addressed by the group, and (ii) would unduly and unnecessarily constrain the use of the Ka band for uses other than USATs. A copy of Hughes' separate statement on the Report is attached as Annex B.

45 *See* PanAmSat Comments at 7-8.

46 DIRECTV explains why a DTH system needs to be able to operate at Ka band with a downlink PFD of -116 dBW/m^2/MHz. DIRECTV Comments at 14-16.

47 For example, TRW recommends a downlink pfd threshold of -118 dBW/m^2/40 MHz. TRW Comments at 8. Pegasus recommends a lower off-axis EIRP threshold and

As Hughes previously has explained, the differences in the industry on blanket licensing parameters do not result from differences about engineering calculations. Rather, they reflect differences in views about the types of satellite services that should be facilitated at Ka band, and the cost impact on end users of different design parameters.[48]

1. Off Axis EIRP Threshold

In its Comments, Hughes recommended an uplink coordination threshold consisting of an off-axis (2°) EIRP, under clear sky conditions, of +20.0 dBW/MHz in directions within 3° of the GSO arc. The basic reasons for advocating this power level is that it will facilitate the provision of quality service, minimize equipment costs for end users, and minimize interference into adjacent satellite systems.[49] After reviewing the arguments in the other comments, Hughes still maintains this recommendation.

Hughes and PanAmSat are not the only parties that now propose, or have proposed, an off-axis EIRP density near or below 20 dBW/MHz. Both the history of the BL-WG and the comments in this proceeding show that a value of 20 dBW/MHz is consistent with the satellite systems licensed to a number of companies. Moreover, the technical proposal currently being considered by the European Telecommunications Standards Institute (ETSI) does not support the work of the BL-WG.

First, the fact that many companies have advocated an off-axis EIRP value similar to Hughes's preferred value is evidence that the Ka band satellite systems licensed to those

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retention of pfd limits in Section 25.208. Pegasus Comments at 11, 12-13. VisionStar recommends a downlink pfd threshold of -117 dBW/m^2/MHz. VisionStar Comments at 10).

48 Hughes Comments at 22.

49 Hughes Comments at 23-24, Technical Appendix B.

companies are compatible with such a power level. For example, the history of the BL-WG recounted in its November 18 report reveals that Motorola, Morning Star and Ka Star all initially proposed limits that are consistent with their systems. Motorola initially proposed a value of 15 dBW/MHz and, as noted in its Comments, reluctantly signed on to the value of 25 dBW/MHz proposed in the BL-WG Report and prefers as low a level as possible.[50] Morning Star initially proposed 17.5 dBW/MHz and KaStar initially proposed 21.5 dBW/MHz.[51] Moreover, VisionStar's comments in this proceeding include a table showing that it can meet 20.5 dBW/MHz at 2 degree spacing.[52]

Lockheed Martin contends that any decrease in the uplink spectral density limit below 25 dBW/MHz at 2° spacing "would preclude the deployment of small-antenna user terminals by the Astrolink System and many other licensed Ka-band GSO-FSS Systems, making those systems non-viable."[53] However, Lockheed Martin does not provide any factual information to support its contention that adopting a lower limit would make its system, or any other system, non-viable. Moreover, this statement is contradicted by the fact, noted above, than many others at times have proposed values lower than 25 dBW/MHz.

As set forth in more detail in Annex A, Hughes believes that Lockheed Martin may have a problem with a lower off-axis EIRP density because Lockheed Martin does not want

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50 Comments of Motorola, Inc. at 10-11 (filed November 19, 1998) ("*Motorola Comments*").

51 November 18, 1998 Report of the BL-WG at 8, Figure 1 ("*BL-WG Report*").

52 Comments of VisionStar, Inc. at 9-10 (filed November 19, 1998) ("*VisionStar Comments*").

53 Lockheed Comments at 14-15.

to employ uplink power control in order to minimize the power needed to close its links and thereby reduce the potential for interference into adjacent satellite systems. The Commission's Rules require that "all earth stations in the Fixed Satellite Service in the 20/30 GHz band shall employ uplink adaptive power control or other methods of fade compensation such that the earth station transmissions shall be conducted at the power level required to meet the desired link performance *while reducing the mutual interference between networks.*"[54] The Lockheed system design seems to turn the intent of Section 25.204(f) on its head, by placing the maximum amount of interference into other systems most of the time and least interference (during rain) a small fraction of the time.

In an effort to support the high off-axis EIRP limit proposed by the BL-WG, GE Americom and KaStar comment on the apparent "closeness" between that value and the off-axis EIRP proposal currently being considered by the European Telecommunications Standards Institute (ETSI).[55] As explained in more detail in Annex A, GE and Ka Star are making an "apples to oranges" comparison that is based on a fundamental misunderstanding of that proposed ETSI limit.

The technical basis for the ETSI value actually supports the 20 dBW/MHz *clear sky* off-axis value that Hughes and PanAmSat recommend. The ETSI proposal is fundamentally different because it is a hard power limit that already *includes* a 6 dB margin for rain fade. Taking into account the use of increased power to manage rain fade, the clear sky off-axis EIRP

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54 47 C.F.R. § 25.204(f) (1997) (emphasis supplied).

55 *See* GE Americom Comments at 11; KaStar Comments at 14.

value proposed by the BL-WG, KaStar, and GE would result in an earth station *exceeding* the proposed ETSI limit in rain conditions.

Thus, the technical work currently under way in Europe does not support to BL-WG's proposed 25 dBW/MHz clear sky threshold. On the contrary, it provides support to the Hughes' clear sky EIRP threshold of 20 dBW/MHz.

2. Downlink PFD Threshold

In its Comments, Hughes recommended a downlink coordination threshold consisting of an average power flux density on the earth's surface of -118 dBW/m^2/MHz over any contiguous 40 MHz segment. Hughes continues to support this value.

The main reason for advocating this power level is that it will facilitate the provision of Ka band service at a quality level that is equivalent to that provided today by Ku band VSAT terminals without adversely affecting a neighboring satellite system that may choose to operate at the 2 dB lower pfd level recommended by the BL-WG.[56]

Finally, Hughes notes that Hughes and PanAmSat are not the only parties that now propose, or have proposed, a downlink PFD threshold in the range of -118 dBW/m^2/MHz. TRW recommends a downlink pfd threshold of -118 dBW/m^2/40 MHz.[57] Pegasus recommends retention of the pfd limits in Section 25.208.[58] VisionStar recommends a downlink pfd threshold

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56 Hughes Comments at 24, Technical Appendix B.

57 TRW Comments at 8.

58 Pegasus Comments at 11, 12-13.

of -117 dBW/m^2/MHz.[59] Moreover, DIRECTV has explained why a DTH system needs to be able to operate at Ka band with a downlink pfd of -116 dBW/m^2/MHz.[60]

B. International Application

Both the BL-WG and Ka-Star have proposed that the blanket licensing parameters being recommended by the BL-WG become the terms and conditions under which U.S. GSO Ka band satellite licensees will need to coordinate their spacecraft both in the U.S. and around the world.[61] Effectively, these parties seek to impose the BL-WG's parameters as limits on U.S. licensed GSO Ka band spacecraft around the world. There are two problems with this suggestion.

First, the work of the BL-WG was framed to address *only* recommended parameters for blanket licensing small earth stations in the U.S. It did not consider (i) whether these values should apply outside the U.S., (ii) whether the competitive, technical or other circumstances outside the U.S. are different, (iii) whether different types of services might be provided outside the U.S., and (iv) what preclusive impact these values would have on other services, such as DTH services, if they were converted into limits on spacecraft operations. As noted in more detail below, the issues here are far too complex, and the stakes too high, to apply parameters outside the context in which they were developed. Hughes' dispute with the potential misapplication of the work of the BL-WG is one of the reasons Hughes declined to support the November 18, 1998 Report of the BL-WG.[62]

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59 VisionStar Comments at 10.

60 DIRECTV Comments at 14-16.

61 BL-WG Report at 5; KaStar Comments at 14.

62 *See* Annex B (Separate Statement of Hughes on the BL-WG Report).

Second, applying these rules to GSO FSS operations around the world would unduly constrain the ability of U.S. licensees to compete in foreign countries with foreign satellite systems that are not constrained by such FCC rules.

There is no question that the Commission's prior "blanket license" policies have been instrumental in fostering the development of VSAT networks throughout the United States that serve a wide variety of industries. In order to respond to customer demands, VSAT operators in the U.S. need to be able to provide service start-up without regulatory delay. Most VSAT networks have thousands of associated transmit/receive stations and an individual licensing requirement would simply become too burdensome.

Blanket licensing in the U.S. has been facilitated by the fact that the technical operating characteristics of each spacecraft that serves the U.S. are required to comply with the technical provisions of Part 25 of the Commission's Rules, the Commission's two degree orbital spacing policy in particular. This certainly *is not* the situation in the international area.

There does not exist anywhere else in the world the type of uniform and comprehensive satellite licensing guidelines provided in the Commission's Rules. To the contrary, present ITU rules encourage the development of satellite systems that are tailored for specific and varying applications using a wide variety of technical characteristics. Thus, it is necessary in most parts of the world for Administrations (and their satellite operators) to coordinate the operations of adjacent spacecraft on a case-by-case basis. Moreover, it is impossible to use a single earth station design specification or operating characteristic all around the world because of the wide diversity of technical constraints, including intersatellite spacing, satellite receive and transmit power levels, and local terrestrial interference levels.

Any attempt to impose U.S. blanket licensing technical parameters on U.S. spacecraft operations outside the U.S. would preclude the ability to respond to different market conditions in foreign countries. Moreover, it would serve no real purpose since every foreign country is likely to have licensing procedures of its own. Even if two U.S.-licensed spacecraft were located near each other over some other portion of the globe, local factors, whether regulatory, technical or market, may necessitate operation at variance from U.S. blanket license provisions. In fact, given the wide diversity of Ka-band system designs and ITU filings already promulgated, it is likely that some U.S. satellite operators will find themselves adjacent to foreign systems that are not compatible with U.S. blanket licensing parameters. In those cases, the U.S. systems need full flexibility to respond to these conditions, unconstrained by U.S. earth station licensing criteria.

For these reasons, Hughes urges the Commission to reject the proposals to impose blanket license provisions on the operation of U.S. licensed spacecraft in foreign countries. To do so would preclude the design of U.S. spacecraft to meet the specific service and other market needs in foreign nations, and also preclude the ability to coordinate successfully with nearby foreign satellite systems.

C. Coordination at Different Values

Hughes also urges the Commission to reject the proposal of the BL-WG and Lockheed with respect to inter-system coordination agreements. If two adjacent U.S. licensed satellite operators enter into to a coordination agreement, one party launches its system and the other does not, and the operating system deploys a system that, pursuant to the coordination agreement, does not comply with the blanket licensing parameters, these commenters suggest

that the operating system should bear the burden of recoordinating with any new licensee at the neighboring location.[63] In other words, these commenters effectively endorse the establishment of power limits that an operator can exceed only if it is willing to risk the chance that it might be required to fundamentally change its business to accommodate a new neighboring system many years from now. Hughes also dissented from the Report of the BL-WG due to disagreement over this issue.[64]

There are two infirmities with this suggestion. First, as noted above, the blanket licensing parameters were not developed with a view toward imposing perpetual homogeneity on U.S. licensed Ka band spacecraft. The work to date simply has not taken into account many of the systems that have been proposed in the second Ka band processing round, or the potentially preclusive effect of these parameters on DTH service at Ka band. Thus, no one has fully evaluated the full extent that power limitations would have on the continued deployment of Ka band satellite systems.

Second, this proposal is simply unacceptable as a business matter. Essentially, it means that a satellite operator who enters into a binding coordination agreement with its neighbor and builds a business based on that agreement must live at the constant risk that any new licensee who might replace that neighbor has the right to force the existing satellite operator to "power down" and thereby disrupt service to existing customers. Such a requirement would be unprecedented in the satellite industry, would provide undue negotiating leverage to the newcomer, and would be inconsistent with existing Commission precedent on inter-satellite

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63 BL-WG Report at 4-5; Lockheed Comments at 15.

64 *See* Annex B (Separate Statement of Hughes on the November 18, 1998 Report)

coordination, which generally requires the newcomer to bear the burden of coordinating with in-orbit systems.[65]

Bilateral inter-system satellite coordinations are vital to the industry. They provide the certainty for investing hundreds of millions of dollars per spacecraft, and entering into contracts to provide services to countless users. The mere substitution of an adjacent licensee should not place in jeopardy any business that has been built in reliance on an inter-system coordination agreement.

D. Blanket Licensing at 29.25-29.5 GHz

Finally, as noted in Hughes' Comments, and as other parties agree,[66] blanket licensed earth terminals must be permitted to operate in the 29.25-29.5 GHz uplink band in order to provide adequate capacity for licensed Ka band GSO FSS systems.

The 29.25-29.5 GHz band was made available for the deployment of ubiquitous small GSO FSS earth stations as part of the delicate compromises that allowed the adoption of the 28 GHz Band Plan. No company achieved precisely what it wanted in that band plan, and the Commission should not countenance the efforts of Motorola and Iridium to renege on the compromises they accepted and to attempt to revisit the 28 GHz deal.[67]

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65 *See, e.g., GE American Communications*, 7 FCC Rcd. 3212 at ¶ 3 (1992) ("We note that the burden is on GE, as the licensee of the newly replaced satellite, to coordinate with existing satellites to assure that harmful interference does not occur."); *Hughes Communications Galaxy,* 5 FCC Rcd 1184 at ¶ 9 (1990) ("As with all licensees of new satellites, it is incumbent on AT&T to coordinate its operations with the operations of adjacent in-orbit satellites before it brings its satellite into service.").

66 Lockheed Comments at 20-22; KaStar Comments at 16.

67 *See* Motorola Comments at 19; Comments of Iridium LLC at 2-3 (filed November 19, 1998).

Moreover, the general statements in Iridium's and Motorola's Comments here do not in any way rebut the technical showing that Hughes made in its Comments on the sharing this band between ubiquitous GSO FSS terminals and feeder links for MSS satellite systems.[68]

III. NGSO FSS BLANKET LICENSING

The initial comments raise two distinct issues with respect to NGSO FSS blanket licensing: (i) Teledesic raises the issue of the proper procedure and forum for developing appropriate blanket licensing parameters for NGSO FSS systems utilizing the NGSO-primary bands (18.8 - 19.3 GHz and 28.6 - 29.1 GHz) and (ii) Motorola raises the related issues of blanket licensing secondary NGSO FSS systems utilizing the GSO-primary bands and the showing that these secondary systems must make in order to access the GSO-primary bands.

A. NGSO/NGSO Issues

Regarding the issue raised by Teledesic, Hughes, as an applicant for a second round NGSO FSS system, is in favor of developing blanket licensing parameters for both licensed and pending NGSO FSS systems. However, given the variety of proposed NGSO orbits and architectures, blanket licensing in the NGSO context is necessarily more complicated than in a GSO context. Moreover, as explained in Annex C, the terms for NGSO earth station blanket licensing and the terms for NGSO FSS space station sharing are inextricably interrelated. Thus, Hughes supports the formation of an industry working group that would address sharing between Teledesic's system and the pending Ka band NGSO FSS applications, and related blanket licensing terms.

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[68] Hughes Comments at 12, Technical Appendix A.

Even Teledesic seems to admit that, as a practical matter, NGSO blanket licensing parameters must be dealt with in connection with developing the terms for NGSO FSS space station sharing.[69] In light of the Commission's oft-stated policy goal to ensure multiple NGSO FSS systems access to the 18.8 - 19.3 and 28.6 - 29.1 GHz bands,[70] the consideration of blanket licensing for systems must take into account the needs of second round NGSO FSS systems.

B. GSO/NGSO Issues

Regarding the issues raised by Motorola, it is critical to keep in mind a fundamental tenet adopted as part of the 28 GHz band plan just two years ago: NGSO FSS systems outside the 18.8 - 19.3 and 28.6 - 29.1 GHz bands must operate on a secondary, strict noninterference basis to GSO FSS systems. This is only fair as NGSO systems were given their own primary 500 MHz at 18.8 - 19.3 GHz and 28.6 - 29.1 GHz. As Hughes has noted with respect to Motorola's proposed Celestri-LEO system, "[f]or a primary user, like a GSO FSS system, there is an important and fundamental difference between (i) the Commission's not licensing a secondary user until it makes an adequate showing of technical compatibility, and (ii) being forced to shut off an interfering secondary user who already holds a license to operate."[71]

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69 Teledesic at 10-11 ("If the Commission finds that a particular proposal inappropriately limits the possibilities for further NGSO FSS entry, the Commission has the option to deny the earth station application . . . .").

70 In the Matter of Teledesic Corporation Application for Authority to Construct Launch, and Operate a Low Earth Orbit Satellite System in the Domestic and International Fixed Satellite Service, File Nos. 22-DSS-P/LA-94, 43-SAT-AMEND-95, 127 SAT-AMEND-95, DA 97-527 at ¶ 28 (rel. March 14, 1997); Ka Band Service Rules Report and Order at ¶ 37-38.

71 *Reply of Hughes Communications Galaxy, Inc. to the Consolidated Opposition and Reply Comments of Motorola, Inc.* at 4, FCC File No. 79-SAT-P/LA-97(63) and SAT-AMD-19980729-00067 (filed November 24, 1998).

Thus, Hughes strongly supports the continued requirement that a secondary user demonstrate, prior to initiating use of a band on a secondary basis, that its "use will not cause interference to users operating on a primary basis, and that it can accept interference from primary service operations."[72]

In essence, Motorola argues[73] (i) that compliance by the secondary NGSO system with the APFD and EPFD limits that are ultimately adopted at WRC-00 will automatically satisfy the demonstration required by a secondary user that it will "not cause harmful interference to stations of primary or permitted services,"[74] and (ii) that the blanket licensing parameters developed in this proceeding for GSO FSS systems will serve as a limit on GSO earth stations and space stations to protect the secondary NGSO from interference in the GSO primary band. Neither of Motorola's arguments is valid.

First, compliance by an NGSO system with ITU APFD and EPFD limits does not ensure that the NGSO system will "not cause harmful interference" to primary systems. Under the APFD and EPFD limits presently under consideration by the ITU, NGSO systems would be permitted to generate a specified amount of interference to GSO systems. Thus, contrary to Motorola's argument that the ITU APFD and EPFD limits are a proxy for secondary status, those limits really represent only a limited constraint on NGSO operations. To substitute the ITU pfd limits for the Commission's own long-standing secondary licensing standards would be to totally disregard the terms of the Commission's 28 GHz band plan and the Ka band Service Rules order,

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72 NPRM at ¶ 33. This requirement was adopted in the Ka band service rules just one year ago. Ka Band Service Rules Report and Order at ¶ 39.

73 Motorola Comments at 7.

74 47 C.F.R. § 2.106(c)(3)(i) (1997).

which serve as the very basis for the licensing of Ka band NGSO and GSO FSS systems. Thus, Motorola's continued efforts to undermine a fundamental premise of the Commission's 28 GHz segmentation order should be rejected.[75] There is no basis to disrupt the delicate balance inherent in the 28 GHz band plan.

Second, as discussed in Hughes' initial comments, the blanket licensing parameters developed in this proceeding are being developed for one purpose and one purpose only: to facilitate the prompt deployment of millions of GSO FSS earth stations. Moreover, these parameters should be viewed as U.S. earth station coordination thresholds, not as limits on spacecraft or earth station power levels.[76] Thus, they are not intended to preclude uses that do not comply with the blanket licensing parameters and certainly have not been developed for purposes of limiting GSO operations to protect secondary NGSO systems. Therefore, Motorola's argument that "the blanket licensing parameters that will be developed for the GSO/FSS system Earth terminals in these bands will define the limits of potential GSO/FSS interference into NGSO/FSS systems" is simply wrong. If the Commission should determine to pursue terms for NGSO sharing in the GSO-primary band, it should do so in a separate proceeding.

Finally, Motorola is wrong when argues that there is no need to take MSS interests into account should the Commission consider licensing NGSO earth stations at 29.5-

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75 *See Petition to Deny of Hughes Communications Galaxy, Inc.* at 2-4, File No. 79-SAT-P/LA-97(63) (filed December 22, 1997); *Opposition of Hughes Communications Galaxy, Inc. to Petition for Reconsideration and Comments on Petition for Reconsideration* at 1-2, CC Docket 92-297 (filed October 21, 1996).

76 Hughes Comments at 16-17; DIRECTV Comments at 14-16.

30.0 and 19.7-20.2 GHz.[77] Contrary to Motorola's suggestion, a co-primary FSS/MSS allocation has existed in this U.S. in this band since 1994,[78] and any secondary NGSO FSS system that proposes to operate in this band still must protect this primary MSS allocation.

IV. CONCLUSION

The 17.7-19.7 GHz band has been a shared satellite/terrestrial band for over twenty-five years. Thus, the current need for band segmentation is not a result of "emerging new services" displacing an incumbent, exclusive use. Instead, the need for segmentation results from a different paradigm: a broader deployment in the 18 GHz band by both satellite and terrestrial systems than was originally expected. Both terrestrial and satellite interests will benefit from a segmentation of the 18 GHz band, because band segmentation will result in faster and less expensive deployment of service by both sets of interests, and will permit both sides to deploy their stations more densely than would be possible if they were combined in a shared band. Therefore, the Commission should take into account the mutual benefits that will flow from segmentation and should adopt a band plan alternative that reasonably accommodates both sides.

The terms for blanket licensing earth terminals are not just technical, engineering issues. Rather the terms for blanket licensing GSO FSS earth stations can have a fundamental impact on the ability of satellite systems to compete effectively with terrestrial

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77 Motorola Comments at 8-9.

78 47 C.F.R. § 2.106 (1997); *Amendment of Section 2.106 of the Commission's Rules to Upgrade to Primary Status the Secondary Mobile-Satellite Service Allocation at 19.7-20.2 GHz and 29.5-30 GHz*, 9 FCC Rcd 3403 (1994). The Commission has determined not to license any MSS systems in this band absent a demonstration of compatibility for the GSO FSS. 28 GHz Report and Order at ¶ 85.

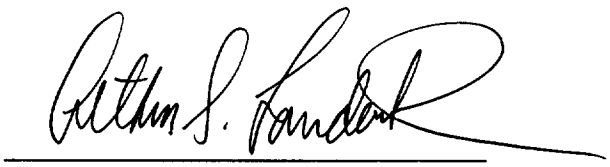
telecommunications providers, and therefore need to be developed with a view toward facilitating the deployment of state-of-the-art satellite systems, and not just accommodating satellite system designs that are three or four years old.

Because the terms for NGSO earth station blanket licensing and the terms for NGSO FSS space station sharing are inextricably interrelated, NGSO blanket licensing must be dealt with in connection with developing the terms for NGSO/NGSO space station sharing. In light of the Commission's oft-stated policy goal to ensure multiple NGSO FSS systems access to the 18.8 - 19.3 and 28.6 - 29.1 GHz bands, the terms for NGSO blanket licensing must take into account the needs of second round NGSO FSS systems.

With regard to secondary NGSO FSS use of the primary GSO FSS bands, it is critical to keep in mind a fundamental tenet of the 28 GHz band plan adopted just two years ago: NGSO FSS systems outside the 18.8 - 19.3 and 28.6 - 29.1 GHz bands must operate on a secondary, strict noninterference basis to GSO FSS systems. Compliance by an NGSO system with possible new ITU rules does not ensure that the NGSO system will "not cause harmful interference" to primary GSO FSS systems. There is no basis to disrupt the delicate balance inherent in the 28 GHz band plan by adopting any such ITU rules as a proxy for a showing of non-interference.

Respectfully submitted,

HUGHES ELECTRONICS, INC.



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ANNEX A

Annex A

UPLINK OFF-AXIS EIRP DENSITY

A. Relevance of ETSI Off Axis EIRP Proposal

In their comments in Docket 98-172, KaStar and GE Americom commented on the closeness between the proposed ETSI 2° off-axis "all conditions" EIRP power limit that currently is being considered and the 25 dB(W/MHz) off axis EIRP "clear sky" coordination threshold that was proposed by the informal GSO Ka Band Blanket Licensing Industry Working Group (BL-WG) in its November 18, 1998 report to the Commission.[1] Those parties claim that the closeness between the two values should provide technical support for the 25 dB(W/MHz) clear sky value off-axis EIRP value that they advocate. This argument is based on a fundamental misunderstanding of that proposed ETSI limit.

The technical basis for the ETSI value actually supports the 20 dB(W/MHz) clear sky off-axis value that Hughes and PanAmSat recommend. As set forth below, the ETSI proposal is fundamentally different because it is a hard power limit that already *includes* a margin for rain fade. Taking into account the use of increased power to manage rain fade, the clear sky off-axis EIRP value proposed by the BL-WG, KaStar, and GE would result in an earth station *exceeding* the proposed ETSI limit in rain conditions.

Currently, the European Telecommunications Standards Institute (ETSI) is holding meetings in an attempt to recommend standards for Ka band earth terminals. Other work is underway that helps to shed light on the current ETSI proposals. Specifically, in October, 1998, three European administrations, France, Luxembourg, and the United Kingdom, submitted several ITU-R Working Party 4A documents advocating a position on Ka-band uplink EIRP at 2 degrees off-axis in directions of the geostationary orbit. The relevant details are as follows:

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1 KaStar Comments at 14; GE Americom Comments at 11.

Maximum EIRP (dB[W/40 kHz])				Off-Axis Angle
ETSI[2]	**France**[3]	**Luxembourg**[4]	**United Kingdom**[5]	
19-25 log ϑ	19 – 25 log ϑ	19 – 25 log ϑ	13 – 25 log ϑ	$2° \leq \varphi \leq 7.0°$
-2	-2	-2	-8	$7.0° \leq \varphi \leq 9.2°$
22-25 log ϑ	22 – 25 log ϑ	22 – 25 log ϑ	16 – 25 log ϑ	$9.2° < \varphi \leq 48°$
-10	-10	-10	-26	$48° < \varphi \leq 180°$

At 2° off-axis, the ETSI, France and Luxembourg proposal is 11.5 dB(W/40 kHz) or 25.5 dB(W/MHz), while the UK's value is 5.5 dB(W/40 kHz) or 19.5 dB(W/MHz).

It is critical to understand that the ETSI, France and Luxembourg proposals specifically are intended to apply as an absolute power limit for *all* conditions, including rain fade conditions. France and Luxembourg argue that an approximately 6 dB margin already factored into the limit should be sufficient to accommodate signal degradation under all rain fade conditions. In other words, their proposed 25 dB value *includes* any additional margin above the minimum clear sky level necessary for the implementation of power control. In contrast, the UK advocates that this should be a limit only for clear sky conditions that can be exceeded to account for rain fade through the use of uplink power control (i.e., that more than 6 dB of rain margin might be needed).

Thus, when the 6 dB rain margin is removed from the ETSI/France/Luxembourg proposed power limit, the value is equivalent to a clear sky value of 19.5 dB(W/MHz). This number is then consistent with the proposed UK clear sky number of 19.5 dB(W/MHz). This number also closely corresponds to the Hughes' clear sky threshold of 20 dB(W/MHz).

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2 *See* ETSI Draft EN 301 358 v1.1.1 (1998-07), Draft EN 301 359 v1.1.1 (1998-07), prEN 301 360 v0.0.1 (1998-09).

3 *See Proposed Modifications to Recommendation ITU-R S.728-1 to Include Off-Axis EIRP Limits for Ka-Band VSAT Earth Stations*, ITU-R WP 4A/157, France, 9/30/98.

4 *See Maximum Permissible Levels of Off-Axis EIRP Density from Earth Stations in the Fixed-Satellite Service Transmitting in the 29.5 – 30.0 GHz Frequency Band,*, ITU-R WP 4A/184, Luxembourg, 10/2/98.

5 *See Study on Off-Axis EIRP Density Limits for GSO FSS Earth Stations Transmitting in the 27.5 – 30.0 GHz Band*, ITU-R WP 4A/125, United Kingdom, 9/28/98.

Moreover, when the need to accommodate rain fade is taken into account, it appears that the power levels permitted by the BL-WG actually would exceed the ETSI limit. In other words, allowing for the use of power control to compensate for 6 dB or more of rain fade would result in a BL-WG sanctioned earth terminal producing a 2° off-axis EIRP density of about 31 dB(W/MHz), which would far exceed the ETSI/France/Luxembourg recommendation. Adding 6 dB of "headroom" for power control to the Hughes preferred value would result in an off-axis EIRP value of 26 dB(W/MHz), which closely corresponds to those European recommendations.

Thus, the technical work currently under way in Europe does not support the BL-WG's proposed 25 dB(W/MHz) clear sky threshold. On the contrary, it provides support to the Hughes' clear sky EIRP threshold of 20 dB(W/MHz).

B. Hughes's Proposed Uplink Off-Axis EIRP Value Is Compatible with Other Ka Band Satellite Systems

Hughes and PanAmSat are not the only parties that now propose, or have proposed, an off-axis EIRP density near or below 20 dBW/MHz. Both the history of the BL-WG and the comments in this proceeding show that a value of 20 dBW/MHz is consistent with the satellite systems licensed to a number of companies.

First, the fact that many companies have advocated an off-axis EIRP value similar to Hughes's preferred value is evidence that the Ka band satellite systems licensed to those companies are compatible with such a power level. For example, the history of the BL-WG recounted in its November 18 report reveals that Motorola, Morning Star and Ka Star all initially proposed limits that are consistent with their systems. Motorola initially proposed a value of 15 dBW/MHz and, as noted in its Comments, reluctantly signed on to the value of 25 dBW/MHz proposed in the BL-WG Report and prefers as low a level as possible.[6] Morning Star initially proposed 17.5 dBW/MHz and KaStar initially proposed 21.5 dBW/MHz.[7] Moreover, VisionStar's comments in this proceeding includes a table showing that it can meet 20.5 dBW/MHz at 2 degree spacing.[8]

In its Comments[9], Lockheed Martin contends that any decrease in the uplink spectral density limit below 25 dBW/MHz at 2 degree spacing "would preclude the deployment of small-antenna user terminals by the Astrolink System and many other licensed Ka-band GSO-FSS Systems, making those systems non-viable". However, Lockheed Martin does not provide

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6 Motorola Comments at 10-11.

7 BL-WG Report at 8, Figure 1.

8 VisionStar Comments at 9-10.

9 Lockheed Comments at 14-15.

any factual information to support its contention that adopting a lower limit would make its system, or any other system, non-viable.

Hughes has examined the pending Lockheed Martin application[10] describing the uplink budgets for the Astrolink II system. Examination of the Lockheed Martin uplink budget for 0.65 meter terminals reveals a specific characteristic that may explain why Lockheed Martin has a problem with a lower off-axis EIRP density: Lockheed Martin does not want to employ uplink power control in order to minimize the power needed to close its links and thereby reduce the potential for interference into adjacent satellite systems. Table 1 below is a duplicate of a small terminal uplink budget appearing in its December 22, 1997 filing.

From Lockheed's data, it appears that the Astrolink II ground terminal always transmits at maximum power, even in clear weather. Hence the ground terminals are always emitting maximum interference toward other satellite systems, thus creating excessive interference into other systems. There is no evidence that power control is used.

FCC Rules require that "all earth stations in the Fixed Satellite Service in the 20/30 GHz band shall employ uplink adaptive power control or other methods of fade compensation such that the earth station transmissions shall be conducted at the power level required to meet the desired link performance while reducing the mutual interference between networks".[11] This Rule was adopted so that minimum interference occurs between systems most of the time and power levels can be increased only occasionally during rain fades. In fact, the Lockheed approach seems to turn the intent of the Commissions' Rule on its head, placing the maximum of interference into other systems most of the time and least interference (during rain) a small fraction of the time.

As can be seen in the different required Eb/No for clear sky and rain conditions, the Astrolink II system addresses rain conditions not by increasing power on a limited basis, but rather by always transmitting at maximum power and simply transmitting less data when rain conditions exist. Thus, the Astrolink II design appears to attempt to maximize its capacity at the expense of causing greater interference to the other Ka-band satellite licensees.

By applying adaptive power control, and using the Eb/No threshold values from the rain column, the Astrolink clear weather EIRP could be reduced by at least 6 dB and still close the link. With such a reduction during clear weather, Lockheed Martin could easily meet an off-axis EIRP density limit of 20 dBW/MHz with a standard antenna design.

In contrast, Hughes's Spaceway system employs adaptive uplink power control and uses a clear sky EIRP of about 40 dBW, which can increase during rain fades. By using adaptive power control and lower power ground terminals, Spaceway intends to enable the use of

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10 Application of Lockheed Martin Corporation for the Astrolink-Phase II Satellite Communications System, filed December 22, 1997, at 69.

11 47 C.F.R. § 25.204(f) (1997) (emphasis supplied).

low cost and low complexity terminals that are affordable to the general public, while minimizing interference into adjacent systems.

Table 1: Uplink Budget for Astrolink Class AA 65 cm User Terminals at -3.8 dB Gain Contour (416 kbps Data rate)

Link Parameters	**Units**	**Clear Sky**	**Rain**
Ground Terminal Location		at -3.8 dB contour	at -3.8 dB contour
Data Rate	kbps	416	416
Frequency	GHz	29.5625	29.5625
Ground Terminal Antenna Diameter	cm	65	65
Ground Terminal RF Transmit Power	Watts	4	4
Ground Terminal Antenna Gain	dBi	44.1	44.1
Ground Terminal EIRP	dBW	49.3	49.3
Elevation Angle	degrees	30	30
Range to Satellite	km	38,609	38,609
Path Loss	dB	-213.6	-213.6
Atmospheric & Other Losses	dB	-0.7	-0.7
Rain Attenuation	dB	0	-10.8
Satellite Receive G/T	dB/K	12.8	12.8
Satellite Received C/N	dB	18.9	8.1
Intra-System C/I	dB	14.1	14.1
Inter-System Interference C/I	dB	22.7	22.7
Total Received C/(N+I)	dB	12.4	7.0
Total Eb/No	dB	9.9	7.5
Required Eb/No	dB	9.5	7.5